APPENDICES

Appendix A Fuel Modification Policy Examples – State of California Department of Parks and Recreation

State of California - The Resources Agency DEPARTMENT OF PARKS AND RECREATION **DEPARTMENTAL NOTICE** No. 2002-4		MANUAL Operations
SUBJECT Fuel Modification Policy		CHAPTER 1100 Visitor Safety
ISSUED February 27, 2002	EXPIRES When Incorporated	REFERENCE DOM 1105.6

DPR 375 (Rev. 10/2001)(Word 10/10/2001)

WHEN APPLICABLE, ENTER THE NUMBER AND DATE OF THIS DEPARTMENTAL NOTICE IN THE MARGIN OF THE MANUAL PAGE, ADJACENT TO THE SECTION(S) AFFECTED BY IT.

The last paragraph in Department Operations Manual Section 1105.6 Fuel Modification Policy states: "The Department shall actively participate in the local land use decision process to prevent conflicts with this policy." The attached form letter template (DPR 181) clarifies the Department's position on new residential and commercial development along park boundaries. This template, customized for your locale, shall be used to respond to proposals to construct new buildings or to modify existing buildings adjacent to wildland park properties. The template text can also be used to respond to CEQA projects and Coastal Permits.

BACKGROUND

Throughout the history of the Department, wildland properties have been acquired in order to protect the natural, cultural, and scenic features for the people of California. Many of these native ecosystems contain plants that can become flammable under specific environmental conditions of high wind, high temperature and low humidity. These ecosystems inevitably burn either from natural or human causes. Buildings constructed in the Urban-Wildland Interface (U-WI) Zone are at risk from wildland fires. There are three principal causes of ignition of structures in the U-WI Zone.

The first cause is aerial flaming brands that land directly on ignitable surfaces of the structure. These brands can originate from wildfires over ½ mile away from the structure. Buildings that are constructed to strict codes of ignition resistive materials are at very low risk of ignition from flaming brands.

The second cause also involves aerial flaming brands. Brands land on accumulations of ignitable materials on, under, or next to the structure, which, in turn, ignite decking or enter attics through soffit vents. This threat can be eliminated by removing organic debris that has accumulated on or under the building and clearing the vegetation that is within 30 feet of the building.

The third cause is severe radiant/connective heat of burning material near to the structure which can either: a) ignite the sides of the building, b) break the windows allowing burning embers into the interior of the building, or c) ignite the interior furnishings through the windows. Fire modeling, analysis of past U-WI Zone fires, and experiments to determine the ignitability of structure have confirmed that even the radiant/connective heat of extreme flaming fronts pose low risk to any structure which is 130 feet or more distant, especially if that structure conforms to strict interface fire codes of ignitability, and window strength and reflectivity.

SITUATION

Private individuals and public fire protection agencies routinely request/demand that Department field staff clear native vegetation on Department wildlands in order to:

1) reduce the threat of wildfire to private property
2) reduce fire insurance costs to private land owners
3) comply with strict local ordinances, and
4) mitigate the Department's liability for maintaining a dangerous condition.

Occasionally property owner's trespass/encroach onto Department lands to clear vegetation.

In many of these scenarios, either the private structure is not constructed to ignition resistant standards, or the vegetation/organic debris next to and on the building is not cleared according to code requirements, or the building is setback an insufficient distance from park property. In some cases all three risk factors are present.

Functioning native ecosystems can be significantly degraded by removing vegetation, through increased soil erosion, increased opportunities for the establishment of exotic species, and wildlife habitat degradation. Unfortunately, vegetation clearing on Department wildlands does little to reduce the risk of structural ignition if the structure itself is inadequately designed and located or the vegetation or debris immediately next to the structure is highly flammable.

Please contact Stephen Bakken (916-654-9934) for questions about the use of the DPR 181.

Dick Troy
Deputy Director
Park Operations

State of California • The Resources Agency — Gray Davis, *Governor*

DEPARTMENT OF PARKS AND RECREATION — Rusty Areias, *Director*

(District Address and Phone No.)

(Date)

(Addressee's Name and Address)

(Dear Mr. or Ms. ___________, or To Whom It May Concern):

It has come to our attention from (permitting agency's agenda) that you have applied to (build or permit) the (residential or commercial) structures proposed for (name of proposed development) which is intended to be installed adjacent to (park unit name). We note if you are not already aware, that these structures will be placed in the urban-wildland interface zone, which can experience wildland fires. We wish to emphasize the importance of careful attention to the design and location of these structures with respect to protection from wildland fires.

We direct you to the Class 1 Ignition-Resistant Construction specifications of the Urban-Wildland Interface Code (International Fire Code Institute, 2000[1]). This model code includes Class A roofing, ignition-resistive siding, decking and other attachments, tempered or glazed/multi-pane windows, and protective measures for eaves, attics and overhangs.

In addition to the steps contained in the model code that you should take to protect your property from fire, a minimum setback between the habitable structure and the state parks property boundary should be established equal to: A) the municipal ordinance for vegetation clearance, (appropriate municipal or county code), or B) 130 horizontal feet (Source: Cohen, 2000[2]), whichever is greater.

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[1] International Fire Code Institute. 2000 ISBN 1-58001-028-8 Urban-Wildland Interface Code. Whittier, California, USA. 49 pp.
Library reference # = ISBN 1-58001-028-8 ;
Internet: http://www.icbo.org/, search for Product # UWIS2K.

[2] Cohen, Jack D. 2000. Preventing Disaster - Home Ignitability in the Wildland-Urban Interface. Journal of Forestry. 98(3):15-21.

DPR 181 (New 2/2002)(Word 2/20/2002)

(Mr. or Ms. ________)
(Date)
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If you have questions or desire additional information about these important steps you can and should take to protect your property, you may contact the (name of local Fire Protection Agency) at (local Fire Agency's phone no.).

Sincerely,

(District Superintendent's Name)
District Superintendent
(District Name)

cc: (Permitting Agency)
(Local Fire Agency)
Department Forester, Field Services Division

Assessor's Parcel Number(s):

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Appendix B Direct, Operational and Indirect Fire Effects on Cultural Resources at Santa Monica Mountains National Recreation Area

Direct Effects

Direct effects are probably the most misunderstood of the fire impacts. This is due to the fact that our knowledge of the effects of fire on stone, metal, bone, wood and other common materials is not yet satisfactory. The more severe the fire behavior, the greater the potential for adverse impacts to cultural resources. Damage to cultural resources from the direct effects of fire include alteration or destruction of artifacts, features, structures, vegetation, and other elements as a result of heat and/or smoke.

Not all materials comprising cultural resources are equally susceptible to the effects of fire. For example, wood is typically damaged at much lower temperatures than metal or stone. This holds true even within single material classes; for example, while a flaked stone artifact might not break unless exposed to very high temperatures, the same artifact will change color at a much lower temperature, impairing the ability of an archeologist to make a proper identification as to its source. A brief description of what is known of the effects of fire on the materials that commonly comprise the archeological resources of the Santa Monica Mountains is presented below.

Flaked Stone

Flaked stone artifacts occur on many prehistoric archeological sites in the Santa Monica Mountains, most often in the form of tools such as projectile points and scrapers, as well as waste material like expended cores and debitage. Common raw materials comprising flaked stone artifacts from the Santa Monica Mountains include cryptocrystalline silicates such as chert and chalcedony, obsidian, various igneous rocks (granite, basalt, andesite, tuff), fused shale, quartzite, and various others (King, 2000).

Experiments have demonstrated that flaked stone artifacts are vulnerable to structural modifications such as breakage, melting, discoloring, and weight loss as a result of heat from fire (Deal, 2001). The vulnerability of a given flaked stone artifact relates to the material from which it is made. For example, cryptocrystalline silicates have been documented to crack, spall, and shatter at 350° C. While not common in archeological sites of the Santa Monica Mountains, obsidian artifacts have the potential benefit of dating through measurement of the obsidian hydration rind. Studies have demonstrated that hydration rinds are subject to elimination or distortion when exposed to temperatures above 100 to 200° C. It is well documented that certain raw materials, cryptocrystalline silicates in particular, were heated prior to working to improve flaking qualities. Physical changes to the raw materials such as color changes and spalling resulting from such heat treatments can also occur during modern fires.

Ground and Battered Stone

Ground and battered stone artifacts also occur with some frequency on Native American Indian archeological sites. Most are constructed from the larger-grained stones mentioned above, such as granite, basalt, andesite, quartzite and sandstone (King, 2000). Common artifact types include millingstones, handstones, mortars, pestles, hammerstones, ornaments, and battered cobbles. Additionally, steatite quarried from Santa Catalina Island and interior California appears in the Santa Monica Mountains as cooking vessels, and bedrock mortars occur on a few bedrock outcrops.

Few data are available on the effects of fire on groundstone artifacts (Deal, 2001). Artifacts observed after low intensity fires tend to have minimal surface defects, while those that undergo high severity heating often exhibit breakage, cracking, oxidation, sooting, and adhesions. Again, the degree of damage appears to correlate with the raw material, with harder volcanic rocks being more durable than sandstone and quartzite.

Shell

Marine shell can occur in Native American (e.g., beads and ornaments, faunal remains) and historical (buttons, faunal remains) archeological contexts in the Santa Monica Mountains (King, 2000). Shell fragments often occur as components of residential middens, while shell beads, ornaments, and clothing fasteners are found in the remains of structures, middens, trash scatters, and associated with human burials.

Waselkov (1987) suggested that shell heated to a high temperature will begin to deteriorate as released calcium oxide mixes with sodium bicarbonate solution found in the soil. Seabloom et al. (1991) found that shell exposed on the surface during a grass fire fractured or disintegrated. Haecker (2000) exposed a shell button and whole oyster shell to relatively low (ca. 245° C) and high (ca. 815° C) intensity fires. In the first, the shell button discolored and the oyster shell remained unchanged, while in the second, the shell button had completely disintegrated, and the oyster shell discolored slightly.

It is important to note that shell beads and ornaments were sometimes intentionally heated or burned in anticipation of manufacture and/or prior to deposition. These may exhibit color and/or physical changes that reflect both cultural behavior, as well as greater vulnerability to subsequent heat exposure.

Bone

Archeological bone specimens occur in the form of food remains, formed tools and human remains in the Santa Monica Mountains (King 2000). These are most likely to be found on the surface of, or buried in, middens and structures of village sites.

Various forms of damage (water loss, charring, chemical alterations) have been documented on bone in laboratory experiments between temperatures of 100 and 1000° C (Bennett and

Kunzmann, 1985; Nicholson, 1993; Bennett, 1999). Experiments performed by Stiner et al. (1995) demonstrated that burned bones are more fragile and brittle than unburned specimens, and that mechanical strength is negatively correlated with the extent and intensity of burning. Bone fragmentation was particularly acute in burned specimens subjected to post-burn trampling. Again, archeological bone was often heated in the context of meal preparation and other activities.

Rock Imagery

Spectacular examples of rock imagery sites occur in the Santa Monica Mountains (King, 2000). Kelly and McCarthy (2001:170) noted that rock imagery panels are highly vulnerable to direct fire impacts including discoloration, soot smudging, rock face spalling, and heat penetration that alters organic binder materials of pictographic elements. Extreme examples of damage have been documented in conjunction with low humidity, heavy fuel loads, hot and dry weather, and erratic winds.

Archaeobotanical Remains

Archaeobotanical remains such as pollen, macrofloral remains and phytoliths are common components of archeological deposits in the Santa Monica Mountains (King 2000). In additional to traditional archeological site context, King (2000) has suggested that Archaeobotanical remains are likely found in ancient soils, and hold a key to determining past vegetation patterns and reconstructing Native American resource procurement patterns.

Fire effects on pollen are not well understood. Scott (1990) suggested that surface pollen was destroyed by moderately high intensity fire behavior, while subsurface pollen was relatively unaffected. Fish (1990), however, found that surface pollen, although physically altered, was still readily identifiable following a wildfire. The effects of fire on phytoliths is unknown.

Unless found in unique depositional contexts (e.g., caves and rockshelters), macrofloral remains such as seed and bulb fragments are unlikely to be preserved in archeological contexts unless carbonized (Micsicek, 1987). Complete carbonization of plant materials occurs between temperatures of 250 to 500° C in low oxygen conditions. Carbonized plant remains are very resistant to further organic decay, often succumbing to nothing less than mechanical damage. Accordingly, Ford (1990) noted no apparent damage to botanical remains recovered from shallow fire hearths in sites burned during a wildfire. Other Archaeobotanical studies where the distinction between modern and archeological charcoal was far less apparent. This phenomenon could be of concern with regard to the contamination of archeological features with modern carbon.

Organic Residues

Organic residues that adhere to, or are absorbed by, artifacts, ecofacts, or features are the subjects of increasing sophisticated lines of inquiry (Heron and Evershed, 1993; Orna, 1996). Among the residues commonly studied include lipids, proteins, carbohydrates, and other biopolymers. Artifacts from the Santa Monica Mountains almost certainly retain some of these signatures.

Heron and Evershed (1993) noted that certain residues are prone to elimination through pre- or post-depositional disturbance, including heating, although that aspect is poorly understood in archeological contexts. More recently, controlled experiments have yielded useful information. For example, based on an analysis of cooking pot residues, Malainey et al. (1999) found that fatty acid composition of plant and animal foods changed dramatically with thermal and oxidative degradation, rendering accurate interpretations difficult. Still, Newman (1995) reported positive immunological reactions on flaked stone artifacts recovered from sites in an area subjected to a high intensity wildfire.

Vegetation

Vegetation with cultural significance occurs in association with prehistoric and historical archeological resources, ethnographic resources, structures, and cultural landscapes. King (2000) suggested that the distribution of certain native plant species, such as oaks, hollyleaf cherry, and yucca, is, in part, reflective of previous native resource management techniques, and that their distribution should be mapped. Non-native species, such as ornamental trees and shrubs, often occur in association with historical structures and cultural landscapes within the Santa Monica Mountains.

Historical Materials

A variety of historical artifacts and features, including glass, metal, wood, ceramic, brick, cement, cinder block, leather, rubber, and plastic, are known or suspected to occur on historical archeological sites, structures, and cultural landscapes within the Santa Monica Mountains. These materials vary widely in their susceptibility to direct fire effects.

Heat build-up, smoke, and flames can all impact glass artifacts and fragments (Haecker, 2000:7-9). Soda lime glass, commonly used for containers, windows, pressed and brown-ware and lighting products, has a melting temperature of about 540° C, while lead glasses melt at 420° C. Crazing, or cracking of glass into smaller, irregular segments, is a common impact associated with exposure to heat, though the degree of effects is related to the type and thickness of the glass, temperature, and distance from the point of origin.

Haecker (2000:10-12) noted that certain metals may actually melt prior to reaching their melting points (Table 8-1) through the process of alloying where a metal with a lower melting point drips onto one with a higher melting temperature, the resulting reaction lowering the melting temperature of the latter. Metal artifacts that do not melt may warp out of shape under certain conditions.

Table B-1 Melting Points of Metal Materials Commonly Found on Historical Archeological Sites

I– II Material	Temperature (°C)	III Artifacts
Aluminum	660	Kitchenwares
Brass (yellow)	932	Cartridge cases, military buttons and insignia
Cast iron	1,350 to 1,400	Kettles, Dutch ovens, wood stoves
Copper	1,082	Kitchenwares, building materials, coins
Gold	1,063	Coins, jewelry
Iron	1,540	Tools, nails, horseshoes, cans, corrugated roofing
Lead	327	Bullets
Nickel	1,455	Plating
Pot metal	300 to 400	Flatware, pots, faucets
Silver	960	Coins, jewelry
Solder (tin)	135 to 177	Patch repair on brass and iron objects
Steel (stainless)	1,427	Eating utensils, kitchenwares
Steel (carbon)	1,516	Heavy machinery parts
Tin	232	Kitchenwares, toys, building materials
White pot metal	300 to 400	Kitchenwares
Zinc	375	Plating for iron objects

Adapted from Haecker (2000:10-11).

Haecker (2000) noted that many historical metal artifacts and features have previously been subjected to the effects of fire through trash burning, structure fires, etc. While many of these were probably not of sufficient temperature to adversely damage metal artifacts, certain components (e.g., lead solder in cans) may have melted, causing a loss of structural integrity and hastening disintegration. Likewise enamel and plating (such as tin, brass and silver) can burn or spall off, exposing the underlying metal to oxidation. Even heavy-duty metals, such as iron and steel, are subject to pitting and other surface damage that can result in long-term attrition.

Potential direct fire effects on historical ceramics are dictated by the characteristics of the paste, glaze, painted decorations, as well as the temperature to which the artifact is exposed (Haecker, 2000). Refined (i.e., glazed) earthenwares (e.g., ironstone, hotel wares) will crack and become discolored at even relatively low temperatures. Porcelains have a melting temperature of about 1550° C, although overglaze paint decorations and makers marks can become discolored and/or eliminated, thereby potentially compromising the ability to accurately identify and/or date the artifact.

Haecker (2000) noted that the rate of wood charring, the carbonization of a fuel by heat or burning, varies widely depending on a number of factors. Typically, a section of dimensional lumber will ignite at about 350° C. Haecker (2000) further noted that wood occurring in historical archeological contexts is particularly susceptible to even low-intensity burning because it is often highly decomposed due to weathering and located in close proximity to other highly flammable materials (e.g., thick vegetation, accelerrents).

Haecker (2000) suggested that porous firebrick is highly susceptible to fire, and that cinder block, certain masonry surfaces, and cement mortar could spall when exposed to fire. Experimental heating performed on gypsum plaster, fire brick, and cement mortar revealed varying effects depending on fire temperature. At about 245° C, the firebrick and cement mortar were unchanged, and the gypsum plaster was discolored and friable. The firebrick discolored and broke, gypsum plaster became even more friable, and the cement mortar discolored at temperatures exceeding 650° C.

Rubber and rubberized artifacts are completely consumed in low intensity fires, while plastics melt between 75 and 265° C (Haecker, 2000). With age, leather objects dry and become brittle and will char in a low intensity fire and be consumed at higher temperatures.

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Appendix C Guidelines for Fire Suppression Activities in Sensitive Resource Areas

1) Information concerning the known location(s) of Threatened and Endangered (T&E) species habitat, T&E species, riparian habitat, woodland habitat, and any other sensitive habitat areas will be made available for use by resource advisors, line officers, incident commanders, the planning section, other agency representatives and will be included in the Wildland Fire Situation Analysis (WFSA).

2) Fire suppression activities will incorporate strategies and tactics to provide protection of sensitive areas, to the maximum extent feasible, while still maintaining firefighter safety and protecting life, property and natural or cultural resources, commensurate with resource value.

3) The following tactical guidelines are recommended for sensitive resource areas:

    - Direct the use of fire retardant and Class A foam to avoid riparian areas. Do not apply Class A foam to any live water course.

    - Consider the life cycle and habitat requirements of T&E species when developing suppression strategies and tactics in riparian areas. This may include water drops, mop-up, and selection of water sites.

    - Avoid construction of dozer lines and hand lines within riparian zones or other sensitive habitat areas whenever possible. Construct handlines along the outside perimeter of riparian or other sensitive zones. Handlines will be used to connect firelines crossing riparian areas where feasible. When dozer lines must be constructed, Minimum Impact Suppression Tactics (MIST) will be used, including raising the blade and walking dozers across riparian and aquatic areas. Firelines should cross streams at right angles to the stream course. Install erosion control measures to protect riparian zones.

    - Inform air and ground operations section personnel on locations and types of T&E species, habitats, the requirements of the Endangered Species Act, and penalties associated with violating the Act.

    - Avoid "burning out" or backfires within riparian zones when possible. Consult the Resource Advisor during planning sessions regarding strategies and tactics.

    - Avoid or minimize concentration of people and equipment such as staging areas, helibases, helispots, base camps and drop points in or adjacent to riparian or other sensitive areas.

    - Avoid opportunities for the introduction of exotic or invasive weeds by removing dirt and seeds from firefighting equipment prior to use in wildfire suppression and rehabilitation.

4) In addition, the following Minimum Impact Suppression Guidelines should be implemented.

Minimum Impact Tactics Guidelines (RM18, Ch. 9, Exhibit 5)

The change from FIRE CONTROL to FIRE MANAGEMENT has added a new perspective to the role of fire manager and the firefighter. The objective of putting the fire "dead-out" by a certain time has been replaced by the need to make unique decisions with each fire start, to consider the land and resource objectives, and to decide the appropriate management response and tactics which result in minimum costs and resource damage.

Traditional thinking, "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire Management now means managing fire "with time" as opposed to "against time." This change in thinking and way of doing business involves not just the firefighter, but all levels of management as well.

National Park Service (NPS) fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's potential or existing behavior, yet leaves minimal environmental impact.

The intent of this guide is to serve as a checklist for the Incident Command and Planning Section Chief, Operations Section Chief, Logistics Section Chief, Division/Group Supervisors, Strike Team/Task Force Leaders, Single Resource Bosses, and firefighters. Accomplishments of minimum impact fire management techniques originates with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

Agency Administrator/Incident Management Team/Firefighter Considerations For Minimum Impact Management

The following guidelines are for park superintendents, incident management teams and firefighters to consider. Some or all of these items may apply, depending upon the situation. Consider:

Command and General Staff

1) Evaluate each and every suppression tactic during planning and strategy sessions to see that they meet superintendent's objectives and minimum impact management guidelines. Include agency resource advisor and/or local representative in above session.

2) Discuss minimum impact management techniques with overhead during overhead briefings, to gain full understanding of tactics.

3) Ensure minimum impact management techniques are implemented during line construction as well as other resource disturbing activities.

Planning Section

1) Use resource advisor to evaluate that management tactics are commensurate with land/resource objectives, and incident objectives.
2) Use an assessment team to get a different perspective of the situation.
3) Use additional consultation from "publics" or someone outside the agency, especially if the fire has been or is expected to be burning for an extended period of time.
4) Adjust line production rates to reflect the minimum impact management tactics.
5) Use brush blade for line building — when dozer line is determined necessary tactics
6) Leave some trees randomly in fireline.
7) Ensure that instructions for minimum impact management techniques are listed in the incident action plan.
8) Detail objectives for extent of mop-up necessary — for instance: "________ distance within perimeter boundary."
9) If helicopters are involved, use long line remote hook in lieu of helispots to deliver/retrieve gear.
10) Anticipate fire behavior and ensure all instructions can be implemented safely.
11) Consider coyote camps versus fixed campsite in sensitive areas.
12) In extremely sensitive area, consider use of portable facilities (heat/cook units, latrines).

Operations Section

1) Emphasize minimum impact management techniques during each operational period briefing. Explain expectations for instructions listed in incident action plan.
2) Consider showing minimum impact management slide-tape program or video to the crews upon arrival at airport/incident
3) Consider judicious use of helicopters--consider long lining instead of helispot construction.
4) Use natural openings so far as practical.
5) Consider use of helibucket and water/foam before call for air tanker/retardant.
6) Monitor suppression tactics/conditions.
7) Distribute field guide to appropriate supervisory operations personnel.

Logistics Section

Ensure actions performed around areas other than Incident Base, i.e. dump sites, camps, staging areas, helibases, etc., result in minimum impact upon the environment.

Division/Group Supervisor and Strike Team/Task Force Leader

1) Ensure crew superintendents and single resource bosses understand what is expected.
2) Discuss minimum impact tactics with crew.
3) Ensure dozer and falling bosses understand what is expected.
4) If helicopters are involved, use natural openings as much as possible; minimize cutting only to allow safe operations.
5) Avoid construction of landing areas in high visitor use areas.
6) Monitor suppression tactics/conditions.

Crew Superintendents

1) Ensure/Monitor results expected.
2) Discuss minimum impact management techniques with crew.
3) Provide feedback on implementation of tactics — were they successful in halting fire spread; what revisions are necessary?
4) Look for opportunities to further minimize impact to land and resources during the suppression and mop-up phase

Implementation Guidelines

Minimum impact management is an increased emphasis to do the job of suppressing a wildland fire while maintaining a high standard of caring for the land. Actual fire conditions and your good judgement will dictate the actions you take. Consider what is necessary to halt fire spread and ensure it is contained within the fireline or designated perimeter boundary.

Safety

1) Safety is of utmost importance.
2) Constantly review and apply the 18 Situations that Shout Watchout and 10 Standard Fire Orders.
3) Be particularly cautious with:
   - Burning snags you allow to burn down.
   - Burning or partially burning live and dead trees.
   - Unburned fuel between you and the fire.
   - Identify hazard trees with either an observer flagging and/or glow-sticks.
   - Be constantly aware of the surroundings, of expected fire behavior, and possible fire perimeter one or two days hence.

Fire Lining Phase

1) Select procedures, tools, and equipment that least impact the environment.
2) Give serious consideration to use of water as a firelining tactic (fireline constructed with nozzle pressure, wetlining).
3) In light fuels, consider:
    a. Cold trail line.
    b. Allow fire to burn to natural barrier.
    c. Consider burn out and use of “gunny” sack or swatter.
    d. Constantly re-check cold-trailed fireline.
    e. If constructed fireline is necessary, use minimum width and depth to check fire spread.
4) In medium/heavy fuels, consider:
    a. Use of natural barriers and cold trailing.
    b. Cooling with dirt and water, and cold-trailing.
    c. If constructed fireline is necessary, use minimum width and depth to check fire spread.
    d. Minimize bucking to establish fireline; preferably build line around logs.
5) Aerial fuels — brush, trees, and snags:
    a. Adjacent to fireline; limb only enough to prevent additional fire spread.
    b. Inside fireline; remove or limb only those fuels which if ignited would have potential to spread fire outside the fireline.
    c. Brush or small trees that are necessary to cut during fireline construction will be cut flush with the ground.
6) Trees, burned trees, and snags:
    a. MINIMIZE cutting of trees, burned trees, and snags.
    b. Live trees will not be cut; unless determined they will cause fire spread across the fireline or seriously endangers workers. If tree cutting occurs cut stumps flush with the ground.
    c. Scrape around tree bases near fireline if hot and likely to cause fire spread.
    d. Identify hazard trees with either an observer, flagging and/or glow sticks.
7) When using indirect attack:

a. Do not fall snags on the intended unburned side of the constructed fireline, unless they are an obvious safety hazard to crews working in the vicinity.

b. On the intended burnout side of the line, fall only those snags that would reach the fireline should they burn and fall over. Consider alternative means to falling, i.e. fireline explosives, bucket drops.

Mop-up Phase

1) Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).

2) Light fuels:

   a. Cold-trail areas adjacent to unburned fuels.

   b. Do minimal spading; restrict spading to hot areas near fireline only.

3) Medium and heavy fuels:

   a. Cold-trail charred logs near fireline; do minimal scraping or tool scaring.

   b. Minimize bucking of logs to check for hot spots or extinguish fire; preferably roll the logs.

   c. Return logs to original position after checking or ground is cool.

   d. Refrain from making bone-yards; burned/partially burned fuels that were moved would be arranged in natural position as much as possible.

   e. Consider allowing larger logs near the fireline to burnout instead of bucking into manageable lengths. Use lever, etc. to move large logs.

4) Aerial fuels – brush, small trees and limbs; remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.

5) Burning trees and snags:

   a. First consideration is allow burning tree/snag to burn themselves out or down (Ensure adequate safety measures are communicated).

   b. Identify hazard trees with either an observer, flagging, and/or glow-sticks.

   c. If burning trees/snag pose serious threat of spreading firebrands, extinguish fire with water or dirt. FELLING by chainsaw will be last means.

   d. Consider falling by blasting, if available.

Camp Sites and Personal Conduct

1) Use existing campsites if available.

2) If existing campsites are not available, select campsites that are unlikely to be observed by visitors/users.

3) Select impact-resistant sites such as rocky or sandy soil, or opening within heavy timber. Avoid camping in meadows, along streams or lakeshores.

4) Change camp location if ground vegetation in and around the camp shows signs of excessive use.

5) Do minimal disturbances to land in preparing bedding and campfire sites. Do not clear vegetation or do trenching to create bedding sites.

6) Toilet sites should be located in minimum of 200n feet from water sources. Holes should be dug 6-8 inches deep.

7) Select alternate travel routes between camp and fire if trail becomes excessive.

8) Evaluate coyote camps versus fixed campsites in sensitive areas.

Restoration of Fire Suppression Activities

1) Firelines:
    a. After fire spread is secured, fill in deep and wide firelines, and cut trenches.
    b. Waterbar, as necessary, to prevent erosion, or use wood material to act as sediment dams.
    c. Ensure stumps from cut trees/large size brush are cut flush with ground.
    d. Camouflage cut stumps, if possible.
    e. Any trees or large size brush cut during fireline construction should be scattered to appear natural.
2) Camps:
    a. Restore campsite to natural conditions as much as possible
    b. Scatter fireplace rocks, charcoal from fire; cover fire ring with soil; blend area with natural cover.
    c. Pack out all garbage and unburnables.
3) General:
    a. Remove all signs of human activity (plastic flagging, small pieces of aluminum foil, litter).
    b. Restore helicopter-landing sites.
    c. Cover, fill in latrine sites.

Appendix D Invasive Species and Weed Management Planning in the Santa Monica Mountains National Recreation Area

Approximately 275 exotic plant species occur in the Santa Monica Mountains National Recreation Area (SMMNRA), composing over 27% of the flora. The California Exotic Pest Plant Council (CalEPPC) has rated 46 of these exotic species to be among those of "greatest ecological concern" in California (Table D-1). Based on workshops with local botanists and land managers the park has identified 14 of the CalEPPC species plus four additional species to be of greatest priority for monitoring and control in the SMMNRA (designated by an "S" under "SMMNRA Priority" in Table D-1). All occurrences of these species are currently being mapped. Three of the SMMNRA priority species and six CalEPPC species occur in stands large enough (> 0.5 ha) to be identified as community types in the vegetation map being developed (designated by a "CT" under "SMMNRA Priority" (Table D-1) .

The park is in the beginning stages of developing a weed management plan for the SMMNRA. The goal of this plan is to analyze the driving factors behind exotic species ingression, identify the manageable dimensions of the problem, and to prescribe actions for containment and control. Fire management is intimately connected to weed management in the SMMNRA because of the connection between fire, fuel management, and the occurrence, establishment and spread of many exotic species in the mountains.

Table D-1 Exotic Pest Plants of Greatest Ecological Concern in the Santa Monica Mountains National Recreation Area

Latin Name	Family	Cal-EPPC[1]	CDFA Nox[2]	SMMNRA Priority[3]	Status
Ageratina adenophora	ASTERACEAE	B			Uncommon
Ailanthus altissima	SIMAROUBACEAE	A-2	C		Uncommon
Ammophila arenaria	POACEAE	A-1		CT	Uncommon
Arundo donax	POACEAE	A-1	C	S	Common
Asphodolus fistulosus	LILIACEAE	—		S	Uncommon
Atriplex semibaccata	CHENOPODIACEAE	A-2			Common
Avena barbata	POACEAE	AG		CT	Common
Avena fatua	POACEAE	AG		CT	Common
Bassia hyssopifolia	CHENOPODIACEAE	B			Uncommon
Brachypodium distachyon	POACEAE	AG			Uncommon
Brassica nigra	BRASSICACEAE	B		CT	Common
Brassica tournefortii	BRASSICACEAE	A-2			Rare
Bromus diandrus	POACEAE	AG		CT	Common

Latin Name	Family	Cal-EPPC[1]	CDFA Nox[2]	SMMNRA Priority[3]	Status
Bromus madritensis ssp. rubens	POACEAE	A-2		CT	Common
Bromus tectorum	POACEAE	A-1			Uncommon
Cardaria draba	BRASSICACEAE	A-2	B		Rare
Carduus pycnocephalus	ASTERACEAE	B	C		Common
Carpobrotus edulis	AIZOACEAE	A-1			Common
Centaurea maculosa	ASTERACEAE	RA	A		Rare
Centaurea melitensis	ASTERACEAE	B	C		Common
Centaurea solstitalis	ASTERACEAE	A-1	C	S	Uncommon
Cirsium vulgare	ASTERACEAE	B	C		Common
Conium maculatum	APIACEAE	B		S	Uncommon
Cortaderia jubata	POACEAE	A-1	C	S	Uncommon
Cynara cardunculus	ASTERACEAE	A-1	B		Uncommon
Ehrharta erecta	POACEAE	B			Common
Erechtites minima	ASTERACEAE	B			Rare
Eucalyptus globulus	MYRTACEAE	A-1			Uncommon
Euphorbia terracina	EUPHORBIACEAE	—	Q	S	Uncommon
Foeniculum vulgare	APIACEAE	A-1		S, CT	Common
Iris pseudacorus	IRIDACEAE	B			Uncommon
Lepidium latifolium	BRASSICACEAE	A-1	B	S	Uncommon
Lolium multiflorum	POACEAE	AG		CT	Uncommon
Mentha pulegium	LAMIACEAE	A-2			Uncommon
Mesembryanthemum crystallinum	AIZOACEAE	B			Common
Myoporum laetum	MYOPORACEAE	A-2		S	Uncommon
Nicotiana glauca	SOLANACEAE	—		S	Common
Pennisetum setaceum	POACEAE	A-1		S, CT	Common
Phalaris aquatica	POACEAE	B		S, CT	Uncommon
Potamogeton crispus	POTAMOGETONACEAE	B			Rare
Ricinus communis	EUPHORBIACEAE	B		S	Common
Rubus discolor	ROSACEAE	A-1			Uncommon
Salsola australis	CHENOPODIACEAE	—		S	Common
Schinus molle	ANACARDIACEAE	B			Uncommon
Schismus arabicus	POACEAE	AG			Rare
Schismus barbatus	POACEAE	AG			Rare
Senecio mikanoides	ASTERACEAE	A-1	C	S	Uncommon
Spartium junceum	FABACEAE	B	C	S	Uncommon
Tamarix ramosissima	TAMARICACEAE	A-1	C		Rare
Vinca major	APOCYNACEAE	B		S	Uncommon

1 California Exotic Pest Plant Council Ranking

List A: Most Invasive Wildland Pests; documented as aggressive invaders that displace natives and disrupt natural habitats. Includes two sublists:

- A-1: Widespread pests that are invasive in more than 3 Jepson (manual) regions
- A-2: Regional pests invasive in 3 or fewer Jepson regions

List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be widespread or regional. Red Alert: Potential to spread explosively; infestations are currently restricted. Annual Grass: Annual grasses abundant and widespread in CA, that pose significant threats to wildlands

2 California Department of Food and Agriculture Ranking

A: Organism of know economic importance subject to state enforced action involving: eradication, quarantine, containment, rejection, or other holding action.

B: Organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner

C: An organism subject to no state enforced action outside of nurseries except to retard spread. At the discretion of the agricultural commissioner.

Q: An organism requiring temporary "A" action pending determination of a permanent rating.

3 Santa Monica Mountains National Recreation Area Mapping Priority

S: 87Species of greatest ecological concern. Mapped as individual species within the SMMNRA

CT: Species that occur in large enough stands (>0.5 ha) to be mapped as vegetation community types.

Appendix E List of Agencies and Recipients Contacted

The following contacts were sent an invitation to obtain a copy of the *Draft SMMNRA Fire Management Plan/EIS*. This list is not exclusive; additional avenues for public input were sought.

Federal Agencies/Offices

- Advisory Council on Historic Preservation
- US Dept. of the Navy, Naval Air Weapons Station, Point Mugu
- US Department of the Interior
  - US Fish & Wildlife Service
  - US Geological Survey
- US Environmental Protection Agency
- Federal Emergency Management Agency
- National Oceanic and Atmospheric Administration
- National Marine Fisheries Service
- Office of Senator Diane Feinstein
- Office of Senator Barbara Boxer
- Office of Congressman Brad Sherman
- Office of Congressman Elton Gallegly
- Office of Congressman Henry Waxman
- Office of Congressman Howard Berman

State Agencies/Offices

- California Coastal Commission
- California Historic Preservation Officer
- California Department of Fish and Game
- California Department of Water Resources
- California Department of Parks and Recreation
- California Department of Transportation
- Santa Monica Mountains Conservancy/Mountains Recreation and Conservation Authority
- Office of State Senator Sheila Kuehl
- Office of State Senator Tom McClintock
- Office of State Assemblyman Paul Koretz
- Office of State Assemblywoman Fran Pavley

County & Municipal Agencies/Offices

- South Coast Air Quality Management District
- Office of Los Angeles County Supervisor Zev Yaroslavsky
- Office of Ventura County Supervisor Linda Parks
- Las Virgenes Municipal Water District
- Calleguas Municipal Water District
- City of Agoura Hills
- City of Beverly Hills
- City of Calabasas
- City of Hidden Hills
- City of Los Angeles
- City of Malibu
- City of Santa Monica
- City of Simi Valley
- City of Thousand Oaks
- City of Westlake Village
- County of Los Angeles Department of Parks and Recreation, Planning Division
- County of Ventura Planning Division
- Conejo Recreation and Park District
- Conejo Open Space Agency
- County of Ventura Fire Protection District (Ventura Co. Fire Dept.)
- The Consolidated Fire Protection District of Los Angeles County
- Los Angeles (City) Fire Department
- Beverly Hills Fire Department
- Charmlee Wilderness Park
- Los Angeles County of Regional Planning
- University of California Los Angeles Stunt Ranch Reserve

Native American Organizations

- Santa Ynez Band of Mission Indians
- Owl Clan Consultants
- Hutash Consultants

Community Organizations

- Mulholland Scenic Corridor Design Board
- Resource Conservation District of the Santa Monica Mountains
- Mountains Restoration Trust
- National Trust for Historic Preservation
- National Parks Conservation Association
- Sierra Club
- Audubon Society
- California Preservation Society
- Southern California Association of Governments